CLAIMS

What is claimed is:

1. A positive active material composition for a rechargeable lithium battery, comprising:

a positive active material comprising at least one lithiated compound; and

at least one additive compound selected from the group consisting of a thermal-absorbent element-included hydroxide, a thermal-absorbent element-included oxyhydroxide, a thermal-absorbent element-included oxycarbonate, and a thermal-absorbent element-included hydroxycarbonate.

2. The positive active material composition according to claim 1, wherein the at least one lithiated compound is a compound selected from the group consisting of compounds represented by the formulas 1 to 13:

$Li_xMn_{1-y}M_yA_2$ (1)

$Li_xMn_{1-y}M_yO_{2-z}X_z$ (2)

$Li_xMn_2O_{4-z}X_z$ (3)

$Li_xMn_{2-y}M_yA_4$ (4)

$Li_xCo_{1-y}M_yA_2$ (5)

$Li_xCo_{1-y}M_y\ O_{2-z}X_z$ (6)

$Li_xNi_{1-y}M_yA_2$ (7)

$Li_xNi_{1-y}M_yO_{2-z}X_z$ (8)

$Li_xNi_{1-y}Co_yO_{2-z}X_z$ (9)

$Li_xNi_{1-y-z}Co_yM_zA_\alpha$ (10)

$Li_xNi_{1-y-z}Co_yM_zO_{2-\alpha}X_\alpha$ (11)

$Li_xNi_{1-y-z}Mn_yM_zA_\alpha$ (12)

$Li_xNi_{1-y-z}Mn_yM_zO_{2-\alpha}X_\alpha$ (13)

wherein,

$0.95 \leq x \leq 1.1$, $0 \leq y \leq 0.5$, $0 \leq z \leq 0.5$, $0 \leq \alpha \leq 2$,

M is one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements,

A is selected from the group consisting of O, F, S, and P, and

X is selected from the group consisting of F, S, and P.

3. The positive active material composition according to claim 1, wherein the thermal-absorbent element is an element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, and Zr.

4. The positive active material composition according to claim 1, wherein said at least one additive compound comprises an amount at or between 0.1 weight % and 1 weight % based on the weight of the positive active material composition.

5. The positive active material composition according to claim 1, wherein said additive compound is prepared by drying a liquid comprising a thermal-absorbent element or a thermal-absorbent element-included compound at a temperature ranging from at or between room temperature and 200°C for at or between 1 and 24 hours.

6. The positive active material composition according to claim 1, wherein said additive compound is amorphous.

7. A method of preparing a positive active material composition for a rechargeable lithium battery, comprising:

drying a thermal-absorbent element or a thermal-absorbent element-included-compound at a temperature ranging from at or between room temperature and 200°C for at or between 1 and 24 hours to prepare an additive compound, the additive compound being selected from the group consisting of a thermal-absorbent element-included hydroxide, a thermal-absorbent element-included oxyhydroxide, a thermal-absorbent element-included oxycarbonate, and a thermal-absorbent element-included hydroxycarbonate; and

adding the prepared additive compound to a positive active material.

8. The method according to claim 7, wherein the thermal-absorbent element is an element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, and Zr.

9. The method according to claim 7, wherein the additive compound is added to comprise at or between 0.1 weight % and 1 weight % based on the weight of the positive active material composition.

10. A positive active material composition for a rechargeable lithium battery comprising:

a positive active material comprising at least one lithiated compound; and

at least one additive compound selected from the group consisting of a thermal-absorbent element-included hydroxide, a thermal-absorbent element-included oxyhydroxide, a thermal-absorbent element-included oxycarbonate, and a thermal-absorbent element-included hydroxycarbonate,

wherein the thermal-absorbent element is one of Al and B.

11. The positive active material composition according to claim 10, wherein the at least one lithiated compound is selected from the group consisting of compounds represented by the formulas 1 to 13:

$Li_xMn_{1-y}M_yA_2$ (1)

$Li_xMn_{1-y}M_yO_{2-z}X_z$ (2)

$Li_xMn_2O_{4-z}X_z$ (3)

$Li_xMn_{2-y}M_yA_4$ (4)

$Li_xCo_{1-y}M_yA_2$ (5)

$Li_xCo_{1-y}M_y\ O_{2-z}X_z$ (6)

$Li_xNi_{1-y}M_yA_2$ (7)

$Li_xNi_{1-y}M_yO_{2-z}X_z$ (8)

$Li_xNi_{1-y}Co_yO_{2-z}X_z$ (9)

$Li_xNi_{1-y-z}Co_yM_zA_\alpha$ (10)

$Li_xNi_{1-y-z}Co_yM_zO_{2-\alpha}X_\alpha$ (11)

$Li_xNi_{1-y-z}Mn_yM_zA_\alpha$ (12)

$Li_xNi_{1-y-z}Mn_yM_zO_{2-\alpha}X_\alpha$ (13)

wherein,

$0.95 \leq x \leq 1.1$, $0 \leq y \leq 0.5$, $0 \leq z \leq 0.5$, $0 \leq \alpha \leq 2$,

M is one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements,

A is selected from the group consisting of O, F, S, and P, and

X is selected from the group consisting of F, S, and P.

12. The positive active material composition according to claim 10, wherein said at least one additive compound comprises an amount at or between 0.1 weight % and 1 weight % based on the weight of the positive active material composition.

13. The positive active material composition according to claim 10, wherein said additive compound is prepared by drying a liquid comprising a thermal-absorbent element or a thermal-absorbent element-included compound at a temperature at or between room temperature and 200°C for at or between 1 and 24 hours.

14. The positive active material composition according to claim 10, wherein said additive compound is amorphous.

15. A positive active material composition for a rechargeable lithium battery comprising:

a positive active material comprising a lithium-cobalt based compound; and

an additive compound comprising an Al-included hydroxide.

16. The positive active material composition according to claim 15, wherein said additive compound comprises an amount at or between 0.1 weight % and 1 weight % based on the weight of the positive active material composition.

17. The positive active material composition according to claim 15, wherein said additive compound is prepared by drying a liquid comprising a thermal-absorbent element or a thermal-absorbent element-included compound at a temperature at or between room temperature and 200°C for at or between 1 and 24 hours.

18. The positive active material composition according to claim 15, wherein said additive compound is amorphous.

19. A positive active material composition for a rechargeable lithium battery comprising:

a positive active material comprising a lithium-cobalt based compound; and

an additive compound comprising a B-included hydroxide.

20. The positive active material composition according to claim 19, wherein said additive compound comprises an amount at or between 0.1 weight % and 1 weight % based on the weight of the positive active material composition.

21. The positive active material composition according to claim 19, wherein said additive compound is prepared by drying a liquid comprising a thermal-absorbent element or a thermal-absorbent element-included compound at a temperature at or between room temperature and 200°C for at or between 1 and 24 hours.

22. The positive active material composition according to claim 18, wherein the additive compound is crystalline.

23. The positive active material composition of claim 1, further comprising another additive compound selected from the group consisting of the thermal-absorbent element-included hydroxide, the thermal-absorbent element-included oxyhydroxide, the thermal-absorbent element-included oxycarbonate, and the thermal-absorbent element-included hydroxycarbonate.

24. The positive active material composition of claim 4, wherein the amount is at or between 0.1 weight % and 0.5 weight% based on the weight of the positive active material composition.

25. The method according to claim 7, wherein the additive compound comprises a mixture of different compounds selected from the group consisting of the thermal-absorbent element-included hydroxide, the thermal-absorbent element-included oxyhydroxide, the thermal-absorbent element-included oxycarbonate, and the thermal-absorbent element-included hydroxycarbonate.

26. The method according to claim 7, further comprising adding a thermal absorbent source to one of an organic solvent and water to prepare a liquid containing the thermal-absorbent element or the thermal-absorbent element-included-compound, wherein said drying the thermal-absorbent element or the thermal-absorbent element-included-compound comprises drying the liquid containing thermal-absorbent element or the thermal-absorbent element-included-compound.

27. The method of claim 26, wherein the thermal absorbent source comprises one of the thermal-absorbent element, a thermal-absorbent element-included alkoxide, a thermal-absorbent element-included salt, and a thermal-absorbent element-included oxide.

28. The method of claim 27, wherein the one of the water and the organic solvent comprises the organic solvent, and said adding the thermal absorbent source comprises adding one of the thermal-absorbent element, the thermal-absorbent element-included alkoxide, the thermal-absorbent element-included salt, and the thermal-absorbent element-included oxide to the organic solvent.

29. The method of claim 28, wherein the organic solvent comprises one of an alcohol, methanol, ethanol or isopropanol, hexane, chloroform, tetrahydrofuran, ether, methylene chloride, and acetone.

30. The method of claim 27, wherein the one of the water and the organic solvent comprises the water, and said adding the thermal absorbent source comprises adding one of the thermal-absorbent element-included salt and the thermal-absorbent element-included oxide to the water.

31. The method according to claim 9, wherein the additive compound is added to comprise at or between 0.1 weight % and 0.5 weight % based on the weight of the positive active material composition.

32. The positive active material composition of claim 10, further comprising another additive compound selected from the group consisting of the thermal-absorbent element-included hydroxide, the thermal-absorbent element-included oxyhydroxide, the thermal-absorbent element-included oxycarbonate, and the thermal-absorbent element-included hydroxycarbonate.

33. The positive active material composition of claim 12, wherein the amount is at or between 0.1 weight % and 0.5 weight% based on the weight of the positive active material composition.

34. The positive active material composition of claim 16, wherein the amount is at or between 0.1 weight % and 0.5 weight% based on the weight of the positive active material composition.

35. The positive active material composition of claim 20, wherein the amount is at or between 0.1 weight % and 0.5 weight% based on the weight of the positive active material composition.